I claim:

1. A method of peripheralizing $CD34^+$ cells comprising the steps of administering a blocking agent of VLA-4 antigen on the surface of the $CD34^+$ cells.

2. The method according to claim 1, wherein the blocking agent is selected from the group consisting of anti-VLA-4 or anti-VCAM-1 antibody which may optionally be human, chimeric, single chain, or humanized, or Fab, Fab', $F(ab')_2$ or F(v) fragments thereof, fibronectin, fibronectin having an alternatively spliced non-type III connecting segment, fibronectin peptides containing the amino acid sequence EILDV or a similar conservatively substituted amino acid sequence that blocks VLA-4-mediated adhesion, soluble VCAM-1, bifunctional VCAM-1/Ig fusion proteins and VCAM-1 peptides.

3. The method according to claim 1, wherein at least a portion of the $CD34^+$ cells are hematopoietic stem cells.

4. The method of claim 1, further comprising the step of administering a stimulating agent of $CD34^+$ cell proliferation in vivo.

5. The method according to claim 2, further comprising the step of administering a stimulating agent of $CD34^+$ cell proliferation in vivo.

6. The method according to claim 3, further comprising the step of administering a stimulating agent of hematopoetic stem cell proliferation in vivo.

7. The method according to claim 4, wherein the stimulation is mediated by 5-fluorouracil or a cytokine selected from the group consisting of G-CSF, stem cell factor, GM-CSF, M-CSF, T-SCF, SCPF, IL-1, IL-2, IL-3, IL-4, IL-6 and IL-11.

8. The method according to claim 5, wherein the stimulation is mediated by 5-fluorouracil or a cytokine selected from the group consisting of G-CSF, stem cell factor, GM-CSF, M-CSF, T-SCF, SCPF, IL-1, IL-2, IL-3, IL-4, IL-6 and IL-11.

9. The method according to claim 6, wherein the stimulation is mediated by 5-fluorouracil or a cytokine selected from the group consisting of G-CSF, stem cell factor, GM-CSF, M-CSF, T-SCF, SCPF, IL-1, IL-2, IL-3, IL-4, IL-6 or IL-11.

10. The method according to claim 7, wherein the cytokine is G-CSF.

11. The method according to claim 8, wherein the cytokine is G-CSF.

12. The method according to claim 9, wherein the cytokine is G-CSF.

13. The method according to claim 10, wherein the cytokine is administered before administering the blocking agent of VLA-4 antigen on the surface of the $CD34^+$ cells.

14. The method according to claim 11, wherein the cytokine is administered before the blocking agents.

Figure 2 shows profiles of both total white blood cells and CFU in peripheral blood before and after treatment of an animal with the anti-CD18 monoclonal antibody 60.3. All symbols are as in Figure 1.

Figure 3 shows results of combined treatment with G-CSF and anti-VLA-4 monoclonal antibody HP1/2. In panel A, symbols are as in Figure 1, except that narrow downward-pointing arrows represent points of G-CSF administration, bold downward-pointing arrows represent points of antibody administration, and dotted lines (with triangles) represent total lymphocyte counts. In panel B, the same symbols show the results for a control animal treated with GCSF alone.

Figure 4 shows high proliferative potential (HPP) progenitors (colonies over 0.5 mm in diameter of compact growth) resulting from combined treatment with GCSF and HP 1/2 antibody (panel A) or GCSF alone (panel B). Symbols are as in Figure 3.

Figure 5 shows the nucleotide sequences encoding the variable regions of the heavy and light chains of anti-VLA-4 murine monoclonal antibody HP 1/2. Panel A is the nucleotide sequence encoding the variable heavy region, with the first nucleotide representing the beginning of the first codon. Panel B is the nucleotide sequence encoding the variable light region, with the first nucleotide representing the beginning of the first codon.

Figure 6 shows results of combined treatment with 5-fluorouracil and anti-VLA-4 murine monoclonal antibody HP1/2. Symbols are as described for Figure 3. Panel A shows the combined results, whereas Panel B shows the results of 5-fluorouracil treatment alone.

Figure 7 shows the nucleotide sequences of V_H- and V_K-encoding regions having CDR-encoding

15. A method of treating cancer in a patient comprising the steps of:

(a) peripheralizing $CD34^+$ cells by administering a blocking agent of VLA-4 antigen on the surface of such cells;

(b) collecting peripheral blood containing the $CD34^+$ cells by leukapheresis;

(c) enriching the $CD34^+$ cells by immunoadsorption using anti-CD34 antibodies;

(d) administering chemotherapy and/or radiotherapy to the patient; and

(e) returning the enriched $CD34^+$ cells to the patient's circulating blood.

16. The method according to claim 15, further comprising the step of administering a stimulating agent of $CD34^+$ cell proliferation in vivo prior to leukapheresis.

17. The method according to claim 15, further comprising the step of expanding the enriched $CD34^+$ cells ex vivo prior to returning the cells to the patient's circulating blood.

18. The method according to claim 16, further comprising the step of expanding the enriched $CD34^+$ cells ex vivo prior to returning the cells to the patient's circulating blood.

19. A method of treating AIDS in a patient comprising the steps of:

(a) peripheralizing $CD34^+$ cells by administering a blocking agent of VLA-4 antigen on the surface of such cells;

(b) collecting peripheral blood containing the $CD34^+$ cells by leukapheresis;

(c) enriching the $CD34^+$ cells by immunoadsorption using anti-CD34 antibodies;

(d) administering myeloablative chemotherapy and/or radiotherapy to the patient; and

(e) returning the enriched $CD34^+$ cells to the patient's circulating blood.

20. The method according to claim 19, further comprising administering an anti-HIV agent to the patient prior to returning the enriched $CD34^+$ cells to the patient's circulating blood.

21. The method according to claim 19, further comprising the step of administering a stimulating agent of $CD34^+$ cell proliferation in vivo prior to leukapheresis.

22. The method according to claim 19, further comprising the step of expanding the enriched $CD34^+$ cells ex vivo prior to returning the cells to the patient's circulating blood.

23. The method according to claim 20, further comprising the step of administering a stimulating agent of $CD34^+$ cell proliferation in vivo prior to leukapheresis.

24. The method according to claim 20, further comprising the step of expanding the enriched $CD34^+$ cells ex vivo prior to returning the cells to the patient's circulating blood.

25. A method for carrying out gene therapy in a patient having a genetic or acquired disease, the method comprising the steps of:

(a) peripheralizing $CD34^+$ cells by administering a blocking agent of VLA-4 antigen on the surface of such cells;

(b) collecting peripheral blood containing the $CD34^+$ cells by leukapheresis;

(c) enriching the $CD34^+$ cells by immunoadsorption using anti-CD34 antibodies;

(d) transfecting the enriched $CD34^+$ cells with a retroviral vector, or other suitable vector that expresses a gene that ameliorates the genetic or acquired disease; and

(e) returning the infected cells to the patient's circulating blood.

26. The method according to claim 25, further comprising the step of administering a stimulating agent of $CD34^+$ cell proliferation in vivo prior to leukapheresis.

27. The method according to claim 25 further comprising the step of administering a stimulating agent of the $CD34^+$ cell proliferation ex vivo prior to infecting the cells.

28. The method according to claim 26 further comprising the step of administering a stimulating agent of the $CD34^+$ cell proliferation ex vivo prior to infecting the cells.